

Summer 2002

## Nebraska Blueprint – Summer 2002

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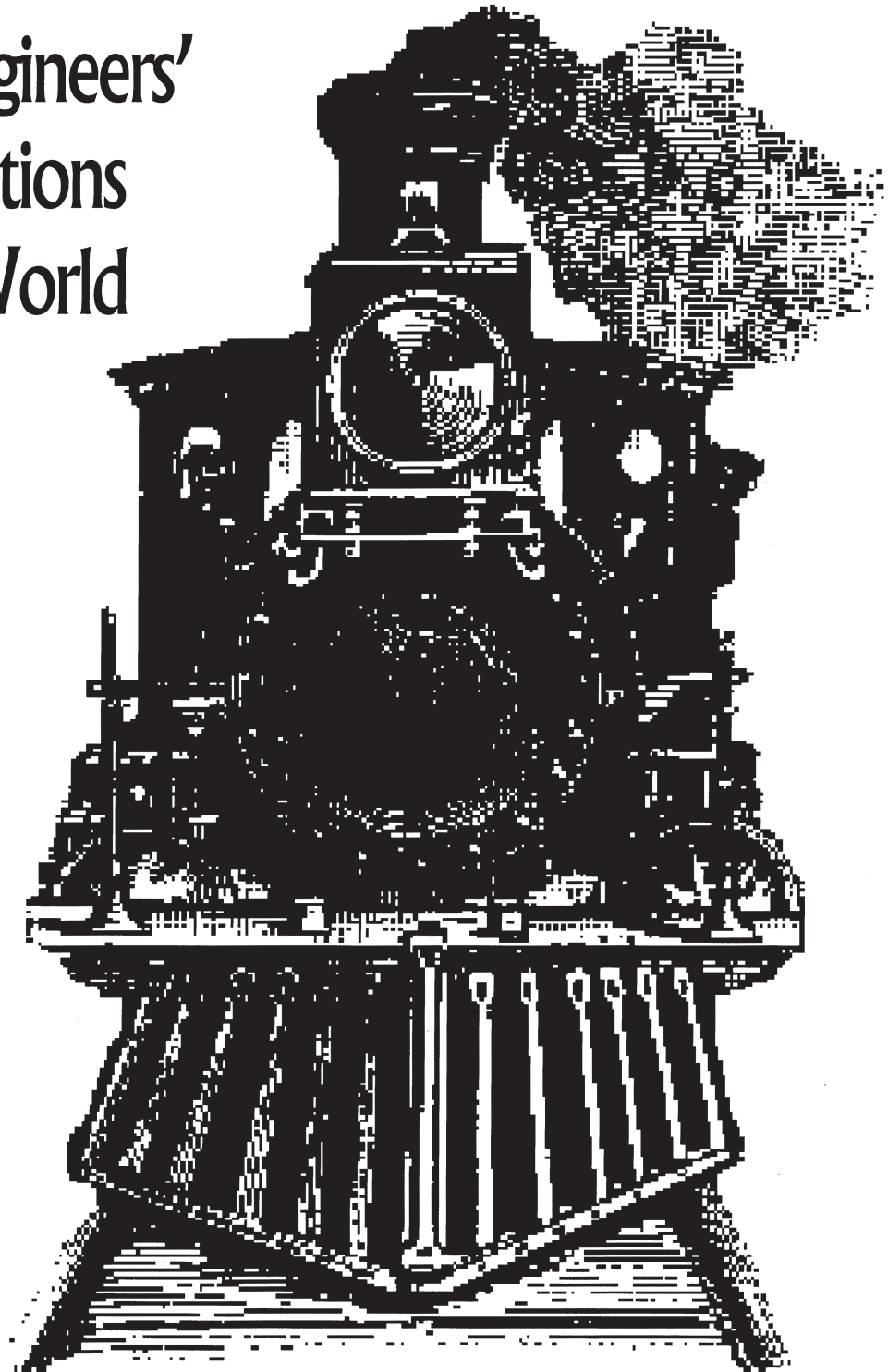
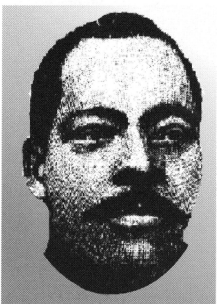
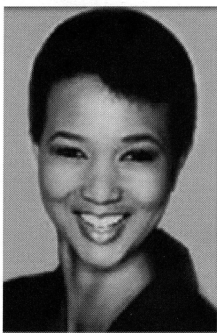
NEBRASKA

# BLUEPRINT

UNIVERSITY OF NEBRASKA-LINCOLN — COLLEGE OF ENGINEERING & TECHNOLOGY

Summer 2002

## Black Engineers' Contributions to the World



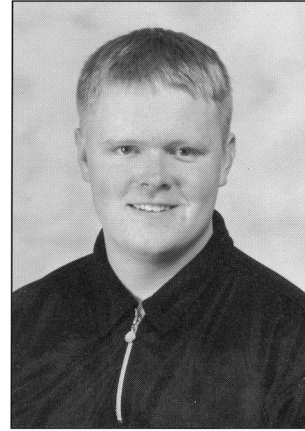


## From the Editor

Welcome to another edition of Nebraska Blueprint. This issue marks the second stand-alone edition since our break from Contacts, and we are still seeing many changes.

In our continuing quest to improve the magazine, we have recruited more staff members to engage in the widening variety of tasks required to assemble the magazine. I would like to welcome and thank the new members of our staff: Aaron Collins, Thomas Cudd, and Josh Rich. Aaron has composed our cover story for this issue, showcasing some of the many contributions to the field made by black engineers. Thomas has bestowed upon us a profile of a nontraditional student who served for two years in the Navy before enrolling as a student at UNL. Finally, Josh has joined us as a business manager. He is working to develop a plan for selling advertising to corporations to generate funding for the magazine. I thank all of our new and veteran staff members for their hard work and many contributions this semester.

This issue of Nebraska Blueprint offers a personal glimpse into our college with a number of student profiles. We also report on some current research being conducted within our college and in conjunction with the College of Dentistry. Thank you for taking a look at our magazine and remember, we are always open to suggestions and story ideas and we are constantly looking for more students to join our team. Contact me at <aholmber@cse.unl.edu>.



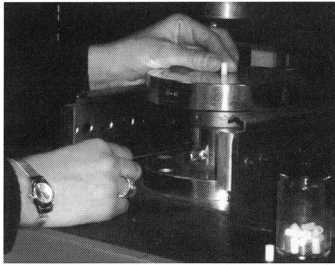
*Aaron Holmberg*



### Learning Community goes to Colorado

Students in the UNL Freshman Learning Community went to Colorado in January where they visited the Coors Brewery (pictured left), Celestica and Kodak.





## Engineers help improve smiles

### ***Engineering students bring technical knowledge to College of Dentistry***

*By Deepak Keshwani  
Biological Systems Engineering*

The field of engineering is witnessing an increasing growth in multidisciplinary research. The Biological Systems Engineering department is no exception. The department is known for innovative undergraduate research. The undergraduate curriculum requires multidisciplinary coursework that leads students to explore research opportunities beyond the walls of the College of Engineering and Technology.

In the past, students have participated in research activities for the University of Nebraska Medical Center, so the involvement of students actively pursuing research projects in the College of Dentistry comes as no surprise. Students from the department first started working at the Dental College approximately four years ago. Dr. Mark Beatty, Associate Professor at the Dental College, recalls the efforts of Dr. Rhonda Brand of Biological Systems Engineering to encourage student interest in engineering aspects of dental research.

Researchers at the Dental College believe that engineering students bring different approaches to solving problems.

"Their knowledge of sensors and software has been very helpful," Beatty said.

Beatty said a significant aspect of dental research is geared toward repair and assessment of biological structures. This involves the knowledge of statics and dynamics that engineering students possess. Apart from the research aspect, Dr. Laura Iwasaki, Assistant Professor at the Dental College, believes that engineering is an excellent prerequisite for dental school.

The response from Dental College faculty regarding the quality of work is overwhelming.

"The experience working with these students has been outstanding and, moreover, our research has moved faster because of them," said Beatty. Dr. Jeff Nickel, Assistant Professor echoed his sentiments in this regard.

In the past, one of the accomplishments of BSE students has been the development of a software program in Visual Basic that is used in measurement of tooth movement. Aaron Jacobsen, a former BSE student, developed the program. Alastair Hoyt, Aaron Wlaschin and Mark Kimmel also worked at the Dental College before graduating from the College of Engineering and Technology.

Currently, Krista Evans, a senior BSE student, is actively pursuing a research project. She has been working for Beatty in the Biomaterials research laboratory since April 2001. The primary research conducted in this laboratory is the mechanical testing of biomaterials for

dental student, graduate student and professors' research. Most recently, Adam Shaver, also a BSE student, was added to this research group.



**Above:** Krista Evans, Biological Systems Engineering, works on the INTRON machine with Bobby Simetich, a research technologist for the Dental College. The machine is used to test a variety of materials. **Top:** Evans places a specimen in an older INTRON machine.

*Continued on Page 10*

## Professor, student, take team approach

By Rebecca Oltman  
Computer Science and Engineering

Last year, Katie Schmatz learned a lot about teamwork. The industrial and management systems engineering graduate (May, 2002) worked with Dr. Stephanie Adams, assistant professor, IMSE, to find out what exactly makes teams work. The project was done through UCARE.

UCARE, Undergraduate Creative Activities and Research, allows students to do research at the undergraduate level. The University of Nebraska-Lincoln introduced the program in the fall of 1999. Since then, more than 150 students have participated. Designed as a two-year program, students spend the first year working as an assistant on their sponsoring faculty member's research. The second year they work on their own projects.

Adams mentioned a possible project idea to Schmatz and the two began working together. The project involves creating a model to assess teaming and its relationship to learning. Schmatz helped develop a methodology to train teams.

ABET recently began urging colleges and universities to emphasize working in multi-disciplinary teams as part of a graduate program, making the project especially important, Schmatz said. The model answers these questions: What does it mean to function on a multi-disciplinary team? How can faculty effectively measure students' ability to do so? How does the use of teams in courses enhance students' ability to function on teams? What effect does teamwork have on learning?

Their research explores various aspects of the elements necessary for a successful team. Some examples are: conflict resolution, effective communication, clear purpose, understanding each member's role, feeling safe to speak freely and accountability. These observations provide key data into understanding the team dynamic.

Schmatz read a lot of literature on successful teams as



Dr. Stephanie Adams and Katie Schmatz go over research material that will be used in their project.

well as why teams fail to understand how to construct a good one. She also studied the literature on training methodologies to understand how people learn and retain information. She then proposed a model that encompasses "how people learn" and "what they need to learn."

The two designed an experiment in which two classes studying the same subject will be assigned to work in teams. In each class half the students will receive training while the others won't. This should answer two questions: Are there differences between teams that get training and those who don't, and how effective is the training?

Adams believes this research will greatly benefit the academic and industrial engineering communities. Industrial engineering explores efficiency and effectiveness of people and processes. Adams' and Schmatz' research is relatively new to the field.

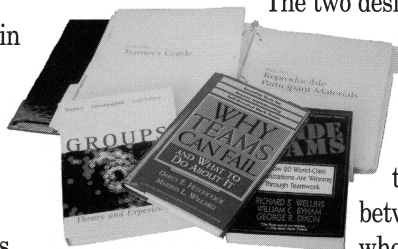
"How people do what they do and how to do it better, along with how they do it together, is very important," Schmatz said.

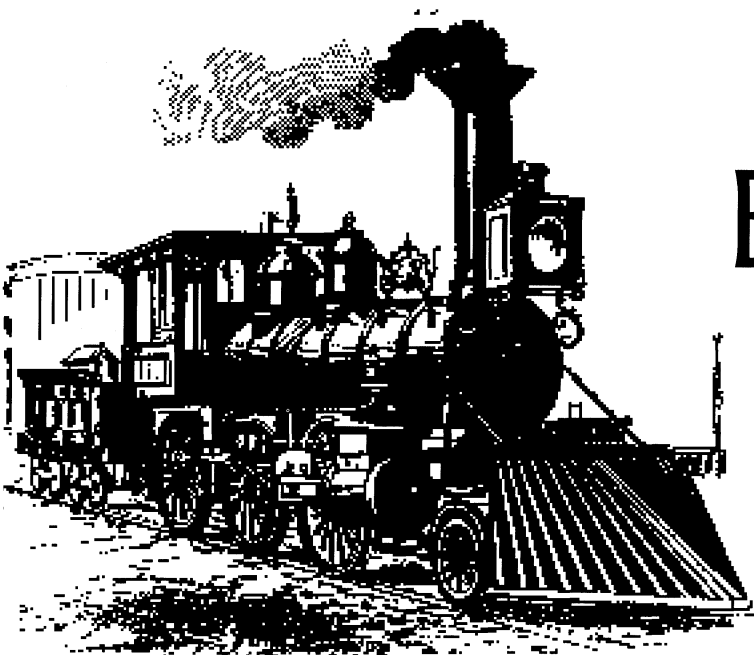
Traditionally, IE focuses more on processes; Adams is looking at people, especially those working together.

She categorizes her research area as engineering education, which often has been overlooked because it is seen as nontechnical in nature. But recently Rensselaer Polytechnic Institute called for a new department head in engineering education, a significant change, Adams said.

"It is very needed, very timely and has the potential to be ground-breaking. ... Engineering education is starting to take off; people are beginning to recognize the value in this research."

Adams will continue her research into this area with another student when classes resume in the fall.





# Black Engineers' Cont

*Engineering: The discipline of science and mathematics blended together to construct, innovate and improve.*

**F**or centuries, there was a pre-conceived notion that only white males, because of the level of intelligence required, could be engineers. An entire race of people was not considered to have the intelligence needed to make contributions to society in the field of engineering. For this reason the doors of opportunity were firmly shut. All that has changed since the end of the Civil War. Black engineers have emerged from dire situations to prove they are capable of being constructors, innovators and improvers. Black engineers of yesterday had to endure racism and prejudice to prove they were worthy of their title. Black engineers of today have to show that the knowledge they possess is valid. The black engineers of tomorrow will show that the parameters of possibility are beyond the sky.

Who were the black engineers of yesterday? How did they reach their positions? What about the black engineers of today? What grounds are to be conquered by the black engineers of tomorrow?

## Yesterday

It doesn't take much to understand that African-Americans in the late 1800's had it bad. In most parts of the country, there were efforts to educate them, but only to a certain extent. Most African-Americans who had a desire to learn taught themselves or found admittance into a university in another country. Those who did find a way to get into an American university, studied, for the most part, liberal arts and law. Science and engineering aspirations, however, were more difficult to fulfill. That didn't stop some individuals.

**G**ranville T. Woods learned engineering from white machine workers while he was working on the railroads. To supplement his education, he had white friends check out books for him from the library (Blacks were not allowed to check out books in certain parts of the country.). Woods eventually managed to find entry into a university on the East Coast to formally study engineering. Known as the Black Edison, Woods helped revolutionize communications and railway systems. He invented more than a dozen devices to improve electric railway cars and others for controlling the flow of electricity. His most noted invention was a system that warned engineers of the proximity of other trains, which helped reduce the number of accidents and collisions.

Woods also invested his time in learning electronics. In 1888 he developed overhead electric conducting lines for railroads, in 1889 he filed a patent for an improved steam boiler furnace, and in 1892 he patented the Synchronous Multiplex Railway Telegraph. Throughout his lifetime, he received more than 60 patents.

**E**lijah McCoy was born to runaway slaves in Ontario, Canada. After completing grammar school, his parents sent him to Scotland to become a mechanical engineering apprentice. Upon returning to the United States, he could not find a job that suited his profession. He did, however, manage to find work in the railroad industry. It was this work that led McCoy to a revolutionary invention.

At that time, locomotive parts needed lubrication in order for the train to run. The only way to do that was to stop the train and do it by hand, a time-consuming and costly process. McCoy created a self-lubricating system, the "graphite lubricator," that did not require the train to stop. This nifty invention gained McCoy popularity and sold across the country. Other companies tried to duplicate his invention, but could not come close to the authentic design. Machinists and engineers who wanted the real deal asked, "Is it the Real McCoy?"

In 1920, McCoy established his own company, the Elijah McCoy Manufacturing Company, and served as a consultant to the railroad industry on patent matters. During his life, he invented and sold 57 different kinds of



# Contributions to the World

By Aaron Collins, Electrical Engineering

devices and machine parts, including a folding ironing board (for which he received a patent) and a lawn sprinkler.

Woods and McCoy had a difficult road in proving that African-Americans were capable of being engineers, but their efforts and perseverance opened doors for many others.

## Today

**B**lack Engineers have been proving their worth in a rapidly changing technology field. W. Lincoln Hawkins received 18 U.S. and 129 foreign patents. The first African-American scientist to work for Bell Labs, Hawkins made universal telephone service possible by co-inventing a chemical additive that prevents the plastic coating on telecommunications cables from deteriorating. He won the National Medal of Technology in the year of his death (1992).

African-American engineers have also taken the tradition of domestic inventions to a high-tech level. David Crosthwait received 34 U.S. and 80 foreign patents and designed the heating system of New York's Rockefeller Center in 1931. He died in 1976. Marie Van Brittain Brown and Albert L. Brown co-patented in 1969 an audio-visual door-monitor/home security system. Clarence L. Elder of Baltimore has earned a number of patents for his energy-saving "Occustat" system, which uses motion detectors to allow thermostats to be lowered in a building's unoccupied rooms. Dr. Mae Jemison, a chemical engineer, medical doctor and astronaut, became the first black woman to blast off into space when she accompanied a U.S./Japan science mission in 1988.

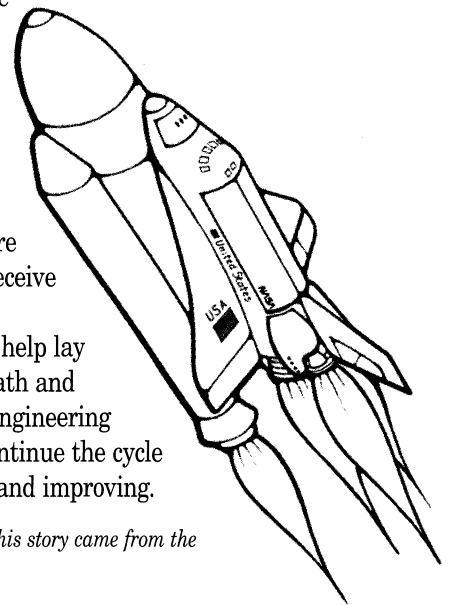
Although there are more black engineers than ever before, the numbers of those working in industry still are low. Charles W. Holmes wrote in the Arizona Republic (July 23, 2000) that a White House advisory group said African-Americans, among other minority groups, make up one-fourth of the total work force in America. The article said only 5.9% of those workers are engineers, a factor called the 'Digital Divide'. Some speculate the reason for this is the lack of adequate education of math and science at the junior and senior high school levels. Many professional black engineers such as Dr. Jemison, who have reached their career peak, now are pouring support into promoting math

and science to minority students.

## Tomorrow

**W**ith more Black engineers entering a variety of fields, what should they pursue now? "I would say that engineers of tomorrow could focus more on academia," said Tony Williams, a graduate student in industrial engineering at UNL and president of the Nebraska National Society of Black Engineers. "I believe this would prove positive for engineers of tomorrow."

Reaching for positions in the academic field, such as professorship and advising, will help future engineering students receive support and mentoring. Teachers are needed to help lay a solid foundation of math and science to prospective engineering students so they can continue the cycle of building, innovating and improving.



*Some information for this story came from the following Web sites:*

- <http://inventors.tqn.com/library/inventors/blmccoy.htm>
- <http://inventors.tqn.com/library/inventors/blwoods.htm>
- <http://www.usi.edu/science/engrtech/MISC/emccoy/htm>
- <http://www.princeton.edu/~mcbrown/display/jemison.html>

*For additional information on Dr. Mae Jemison, go to <http://www.maejemison.com>.*



# Student Profile

## Student finds his place at UNL

By Adam Holmberg  
Computer Engineering

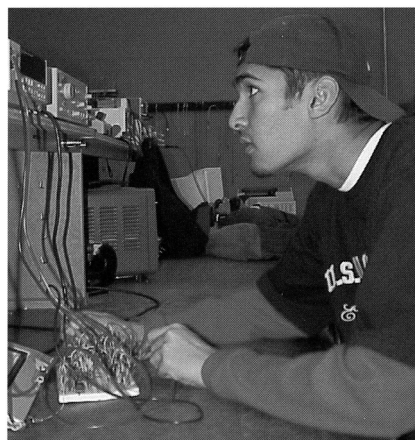


**I**ntelligent. Involved. Funny. Motivated. Ask someone who knows Feroz Patwa and you might hear any of the above words used to describe him. Add to this the impressive list of activities in which he's involved and you've got an engineering student of whom our college can be proud.

Patwa, a senior in Computer Engineering, hails from Dar es Salaam, Tanzania's largest city. He completed his primary education there, then looked to the United States to continue his schooling. After applying to several universities, he chose the University of Nebraska–Lincoln, one of the few state universities in the United States that gives scholarships to international students.

"I applied to a number of places," he said. "Nebraska has a good international student program."

Patwa said he didn't encounter many problems in his transition to American life, except, perhaps, understanding our lax use of the



**Top:** Feroz Patwa plays table tennis during a break from studies. **Above:** Feroz checks out a traffic light controller circuit during an EE lab.

English language. "Idioms were problems, and slang. But now I use them all."

Since arriving at UNL in the fall of 1999, Patwa has been involved in a plethora of activities. He has been a teacher's assistant for two computer science classes, CSCE 101 and CSCE 251Y. He also previously was involved in research with the physics department. During the spring of 2000 he

assisted Dr. Bernard Doudin in his research of nanowires.

When he's not grading, studying or conducting research, Patwa enjoys such sports as tennis, soccer and table tennis – with which he is a force to be reckoned. He holds the title of men's singles intramural champion for 1999 and 2001 and the co-rec doubles title for 2002. He previously represented his country as a national team player but admits that some skill has been lost because of lack of training for extended periods. In fact, he admitted, when he went home last year, some of the players he used to coach beat him. Aside from sports, Patwa also enjoys the nightlife here. When he gets the opportunity, he likes to go 'clubbing' with his friends.

"I don't drink, but I love dancing," he said.

During the summer and fall of 2001, Patwa did an internship at National Instruments in Austin, Texas. There, he participated in a variety of projects during his six-month stay. The tenure began with three weeks of job training classes. These classes helped bring interns up to speed on specific technologies with which they would be working. The first major project Patwa was assigned was evaluating test software. The software was designed to test the signal-conditioning boards the company manufactures. He worked on that project for approximately two-and-a-half months.

The second assignment involved coding for a future release of LabView—a graphic development

*Continued on page 11*

## Ship to shore: Former sailor finds niche in EE

*By Thomas Cudd  
Computer Engineering*

**J**ohn Schiffern is not your typical Electrical Engineering student. Before transferring to the University of Nebraska–Lincoln, this O'Neill, Neb., native was in a pre-engineering program completing his engineering math requirements at Wayne State. But going to Wayne State before coming to UNL is not what sets him apart from other UNL students. Rather, it is his two years of service in the Navy that gave this 26-year-old student his atypical experiences.

Schiffern worked on submarines as a sonar technician; however, he described himself as “more of an operator.” Schiffern also assisted with some research and development with an operability test of an acoustic combat system. His vast experiences with the military and schooling have helped him with research at UNL. Schiffern works with Dr. Dennis Alexander on short pulse lasers. Alexander is the Kingery Professor in Electrical Engineering.

Schiffern enjoys the chance to work with tools that he would not normally encounter in his studies, such as the scanning electron microscopes and femto-second lasers available in the research areas. With this complex application, he has had the opportunity to apply many of the theories he has learned in classes over the years.

The lasers are operated for Laser Induced Breakdown Spectroscopy (LIBS) and in nano-machining to cut small gears out of stainless steel. Schiffern learned some C program-

ming in order to get involved with a nano-machinery project that requires a special compiler.

Schiffern said he would like to stay in the Midwest because of the numerous opportunities available.

Regarding the practicality of his studies about power, Schiffern said “People will always need electricity. [The focus on power] will give me more opportunities in rural areas so I don’t necessarily have to go out on the coasts.”

Schiffern said conducting research helps prepare students for their futures. “I’ve learned so much here... I’m sure it has prepared me [for a career]. With research, you can start

applying what you have learned, and you can learn it better.”

Electrical Engineering 121 (Introduction to Electrical Engineering) has been one of his favorite courses because of the same practicality Schiffern has applied to all of his work. The theory was not too heavy and the class touched on a lot of concepts that carried over to all of the Electrical Engineering courses.

Beginning with the basics all the way up through the most complicated research, Schiffern has taken every opportunity available to him at UNL in preparation for his prospective career in Nebraska.



John Schiffern stands amid several pieces of equipment he uses for research at the University of Nebraska–Lincoln.



## Student's research focuses on air contaminants

By Jairus Gonzalez  
*Architectural Engineering*

**K**im Bunz is a third-year student in Architectural Engineering. The 21-year-old plans to specialize in mechanical with an emphasis in HVAC (heating, ventilation and air-conditioning).

She will spend this summer as an intern with Leo A. Daly in Omaha. In previous summers she has worked through the UCARE (Undergraduate Creative Activities and Research Experiences) program under Dr. Amy Musser, an assistant professor in architectural engineering.

Bunz's project with Musser involved the study of diesel emissions in locomotive repair facilities. Most of the

work involved the measurement of contaminant levels in the air with the goal of creating design guidelines for engineers to follow when working in these types of facilities. This summer Bunz will be working on her own project involving the measurement of

exhaust fumes infiltrating the home from an attached garage.

Ultimately, the goal of these projects is to find feasible solutions to problems that could arise from localized contaminants.



Kim Bunz at the Peter Kiewit Institute in Omaha.

## Engineers help improve smiles

*Continued from Page 4*

"A large part of my time is spent working with an INSTRON mechanical testing machine," Evans said. She said they have tested TMJ (temporomandibular joint) discs, IVD (intervertebral discs), orthodontic springs and wire and molar teeth, and are starting to work with some dental polymers.

In the summer of 2001, students began focusing on the testing of TMJ discs to find Poisson's ratio of dental polymers under physiological strain rates. Evans also has been working on software for data management concerning sheer stress distribution

and collaborated on research presented at a recent dentistry related conference.

Evans said she has enjoyed working with the faculty and staff at the Dental College. "They are all very caring people, who are great to hang out with and are especially fun to work with."

The experience of interacting with the faculty has helped her academically as well, she said. "They've allowed me to use the skills learned in my courses, like elastic bodies and engineering properties of biomaterials,

and learn new ones that are applicable in many other biomaterial research laboratory settings."

The hard work of the engineering students is well appreciated by the faculty at the Dental College. The students have been co-authors on research abstracts and have been acknowledged in published papers.

The involvement of BSE students at the Dental College is just one of many that highlight the culture of academic excellence prevalent in the College of Engineering and Technology.

## Career fairs offer great opportunities

**Get-a-Job Boot Camp, September 10.** Comprehensive job search workshop. Students get information on Career Services resources, Husker Hire Link, job search strategies, resume and cover letters, interviewing and much more.

**Career Fair Prep Nite, September 25.** Industry representatives discuss tips and techniques for networking at a career fair. Nebraska Union; room will be posted. For information, call Career Services at 402.472.3145.

**The Great Nebraska Career Fair, October 2.** Two great events — Career Connections and the UNL College of Engineering & Technology Career Fair — will be held under one roof to better serve both students and recruiters. Representatives from employing organizations will discuss post-graduation jobs and internships with students from UNL and other Nebraska colleges and universities. <http://www.unl.edu/careers/fallfair/>

**Agricultural Sciences and Natural Resources Career Fair, October 3.** Employers from agricultural and scientific fields share career information. <http://casnr.unl.edu/fair/>



**Graduate and Professional School Expo, October 16.** Recruiters from graduate and professional school programs in all areas will discuss educational opportunities. <http://www.unl.edu/careers/gradexpo/>

**10th Annual Alumni of Color Career Forum, November 11.** Invited alumni share and discuss insights and experiences to assist students of color in preparing for tomorrow's uncertain job market. <http://www.unl.edu/careers/events/alumforum.htm>

**Career Kaleidoscope Spring Fair, February 12-13.** A two-day event at which more than 200 employers will discuss career opportunities in a variety of fields.

(2/11) Career Fair PREPNITE

(2/12) Business, Non-Profit, and Government positions

(2/13) Engineering, Scientific, and Technical positions <http://www.unl.edu/careers/springfair/>

**Networking Workshop: "Making the Most of a Recruiter Reception," February (date tba).**

Students of color learn how to meet, mingle and interact while attending a reception of employers and professional recruiters. <http://www.unl.edu/careers/events/networking.htm>

**Students of Color Recruiter Reception, February 12.** A reception that gives recruiters the opportunity to network with UNL students of color. <http://www.unl.edu/careers/events/SOCreception.html>

**Student Job & Internship Fair, April 9.** Employers seeking part-time or summer employees or interns. <http://www.unl.edu/careers/stufair/index.htm>

### Feroz: Finding his place in Nebraska

*Continued from Page 8*

program that engineers and scientists use to create measurement and control applications. That project involved working with Jeff Kodosky, the cofounder of the company. Following his work on those projects, he spent some time as

a support technician for companies that called for assistance with National Instrument products. There he further developed real-world skills for dealing with a diverse range of customers.

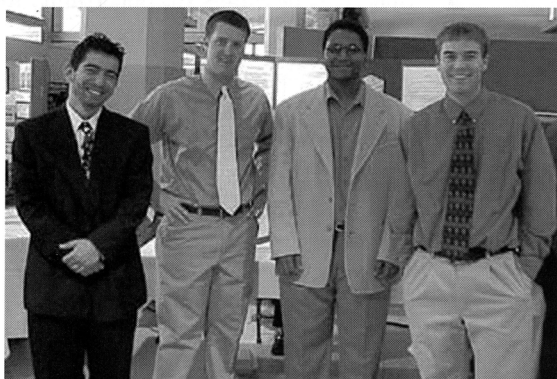
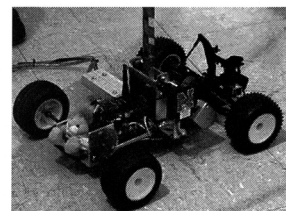
Patwa expects to graduate in May

2003. He says he is enjoying his college experience. He is clearly taking advantage of the many chances to get involved, and many people in the college are proud to call him a friend. After graduation he plans to work in the United States.



# E-Week 2002

## Envision the Future



E-Week events included student activities, such as the Scavenger Hunt (the winning team is shown with Chancellor Perlman and the Energizer Bunny) and the Quiz Bowl (pictured left), and Senior Design Project displays. The Open House also featured events for high school students such as the Straw Bridge Competition (top right) and the Egg Drop Contest (above right).